TOOELE
ARMY DEPOT
ENVIRONMENTAL NEWSLETTER
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Landfill cleanup nears completion

Contractors recently completed the final steps of the corrective measure at the old depot landfill, known as Solid Waste Management Units (SWMUs) 12 and 15. The final site closure reports are currently being prepared for submittal to the Utah Department of Environmental Quality.

The corrective measure action, which began August 1, 2005, was designed to protect people and wildlife from being exposed to the landfill materials, some of which were not adequately covered. Instead of covering the entire landfill, the exposed debris was consolidated to just a few locations within the landfill. In several areas it was found that the exposed debris consisted only of surface litter. At these locations, the debris was picked up and relocated, leaving behind a debris-free ground surface. In other areas, exposed debris was a result of inadequate cover over the disposal site. These were the areas used for debris consolidation. Those areas were covered with at least two feet of clean soil.

The final step in the process was to plant native vegetation to prevent the soil covering from washing away. The seeding took place in early October 2005.

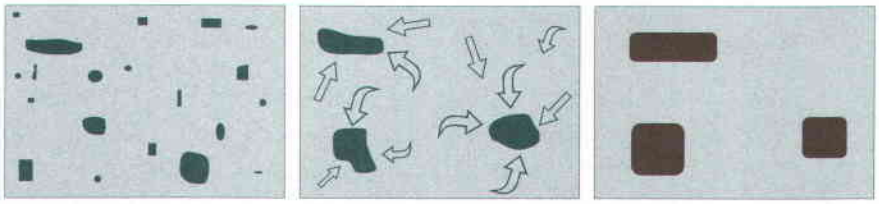
The final remedy is considerably different and less costly than the remedy initially considered. Concern that the landfill was a source of groundwater contamination, led to a recommendation to cover the entire landfill with a cap. This cap would have consisted of layers of soil, clay and a plastic liner, designed to prevent rainwater and snowmelt from seeping through the landfill, and carrying contaminants to the groundwater. The cap was estimated to cost more than $30 million.

Landfill debris (above) is gathered together into designated areas. This process is called consolidation.

Because contaminated groundwater emanating from beneath the landfill co-mingles with the contaminated groundwater coming from SWMU 2, the Army and UDEQ have agreed that the groundwater issues of SWMU 2, SWMU 12/15, and SWMU 58 should all be evaluated in a unified manner. This will provide for more consistent investigation and cleanup of all these co-mingled plumes. As a result of this agreement, the groundwater issue was separated from the SWMU 12/15 corrective measures evaluation. The selected corrective measure allowed the Army to address the risk to human health and the environment at the ground surface in a timely and cost-effective manner, while not impeding the ongoing groundwater investigation.

Consolidating a landfill

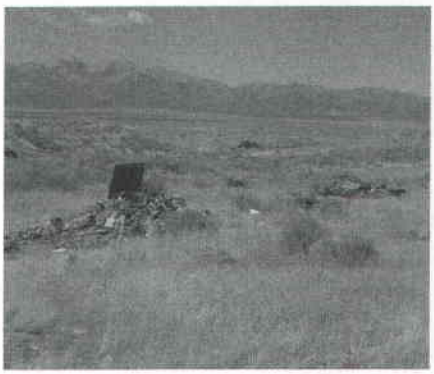
Consolidation is a technique used to make landfills safe without having to cover the entire landfill, which is complicated and very expensive.



Step 1: Identify landfill materials for consolidation
In this step, workers determine what debris needs to be covered. This can include everything from chunks of concrete to tin cans.

Step 2: Move materials to consolidation points
Once the materials have been identified, they are moved to pre-determined locations. It's kind of like sweeping up a floor into several small piles.

Step 3: Cover consolidation points
Two feet of clean soil is spread over the consolidation points so people won't come into contact with the materials. The soil is revegetated with native plants.



Once consolidated, the materials are covered with clean soil (above) to complete the process.

Soil gas testing a valuable tool for finding contamination

Monitoring wells are an important tool to find and define groundwater contamination. They provide a wealth of information, such as the depth of the contamination, the types of chemicals in the water, and which direction the contaminated groundwater is flowing. But one of the most difficult challenges geologists face is knowing where to place these monitoring wells. Once a well location is determined, the composition of underlying soils and the depth to groundwater around Tooele Army Depot can make drilling very difficult, and consequently, expensive. Because of this, alternate methods of information-gathering are often employed.

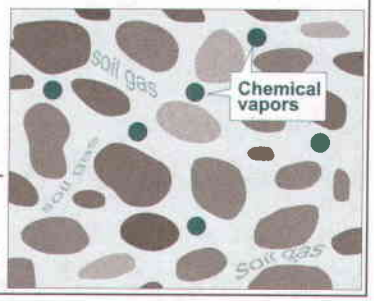
Finding the source of the contamination is one of the most important objectives of any environmental investigation. Scientists know that eliminating the source is the most important step in cleaning up a site. Unfortunately, source areas are often very small areas and are difficult to locate with monitoring wells. So scientists at the Tooele Army Depot are using a method that "sniffs" out contaminated areas and provides information to help identify a source area where a monitoring well can subsequently be installed.

The method is known as soil gas testing. Soil gas testing provides a cost-effective method to detect and measure the levels of chemical vapors in the soil.

What is soil gas?

Soil is not a solid mass of material, but lots of small particles. Between these particles are tiny spaces. Above the water table, air fills the spaces between the particles. Geologists call this air soil gas.

Chemical vapors that have evaporated from contaminated groundwater or contamination sources will work their way into the soil gas and can be detected in soil gas testing.



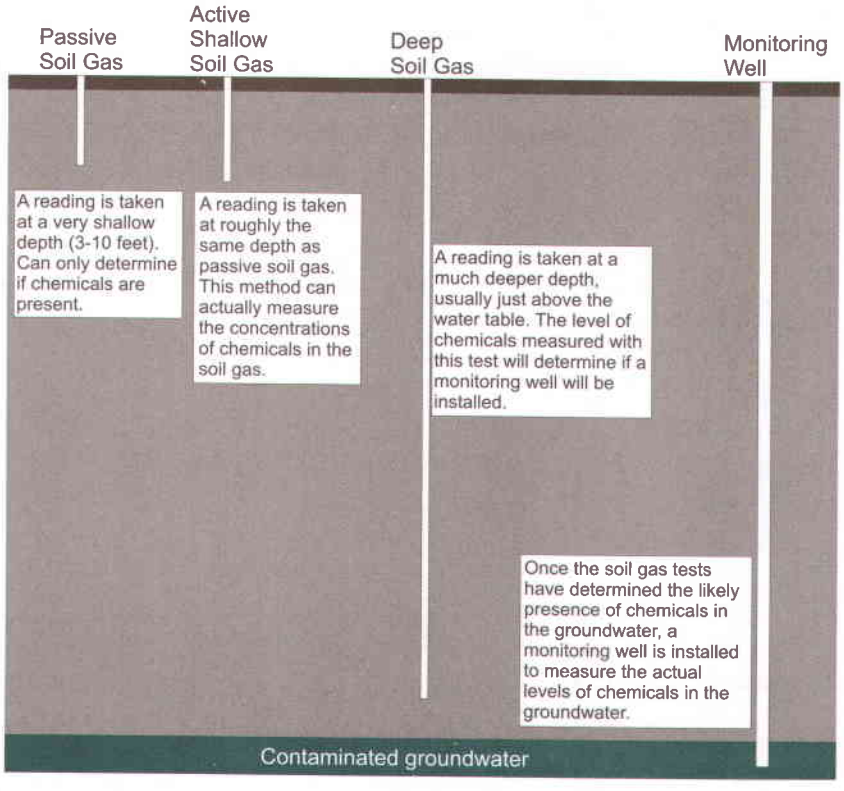
There are three basic methods of testing soil gas. Passive soil gas testing is useful when the location of sources is not well known. A grid pattern of several samples is laid out to cover an area where scientists suspect the source might be. While passive soil gas testing does not provide measurements of concentration, comparing the relative value of samples allows scientists to more accurately locate a contamination source.

Active shallow soil gas testing is a more precise method that often follows a passive soil gas survey at the identified source areas. Scientists use the passive test results to help them optimally determine active soil gas sample locations, which yields more useful results. This method is often used in place of a passive testing in conjunction with a field laboratory. The field laboratory provides scientists with real-time data, which helps them know where to place the next sample points.

Sometimes high detections of chemicals in shallow soil gas samples might not actually indicate that contamination has reached the groundwater. So in areas where the water table is deep, such as Tooele, deep soil gas testing is used to determine if contamination from the sources found with the shallow testing methods actually pose a threat to groundwater. Since the cost of drilling nearly to the water table makes deep soil gas sampling almost as expensive as installing a monitoring well, clear source identification using shallow methods is a necessary first step. When drilling a deep boring for soil gas testing, it is beneficial to collect samples at several depths, which gives scientists a good picture of the distribution and depths of chemicals through the soil.

Soil gas testing is only effective at finding chemicals that evaporate easily, such as trichloroethene, the primary groundwater contaminant at Tooele Army Depot.

Soil gas testing cannot replace monitoring wells, but it can help to control the costs of an investigation by ensuring that the monitoring wells that are installed will provide valuable data.



Geologic investigation takes to the skies

If you're wondering what it was you saw dangling from a helicopter near the Tooele Army Depot in October, it's probably not what you thought it was. And while it may have looked strange, its purpose was purely scientific.

That hexagonal, metal framework suspended from the helicopter was, in fact, a device designed to pulse electromagnetic energy into the ground. It may help the Army refine its knowledge of the complex geology in the earth beneath the depot.

The whole idea is to determine the types of earth materials—soil, rock and water—beneath the depot and surrounding area so geologists can determine where groundwater is flowing and how fast it is moving. With this information, the Army can develop the proper remedies for contaminated areas.

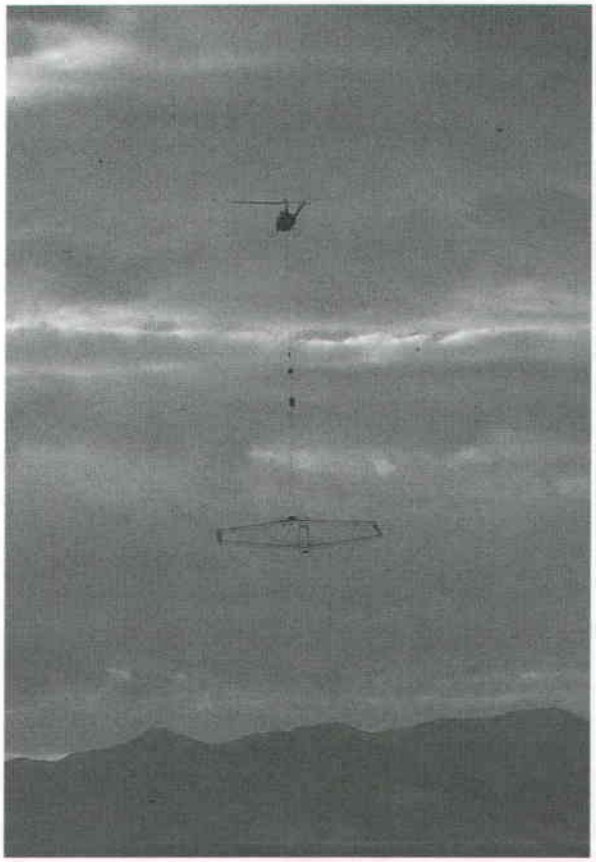
Conventionally, geologists would use wells and soil borings to determine things like the type of soil and the depth of the groundwater. However, this new technology, called SkyTEM, uses electromagnetic energy to explore the subsurface.

In simple terms, this highly technical process uses electromagnetic pulses to "excite" the particles of earth material underground. Different types of material respond differently to the pulses and these differences can be measured. Sensors at the tail of the framework record the responses and feed the information to a computer for future analysis.

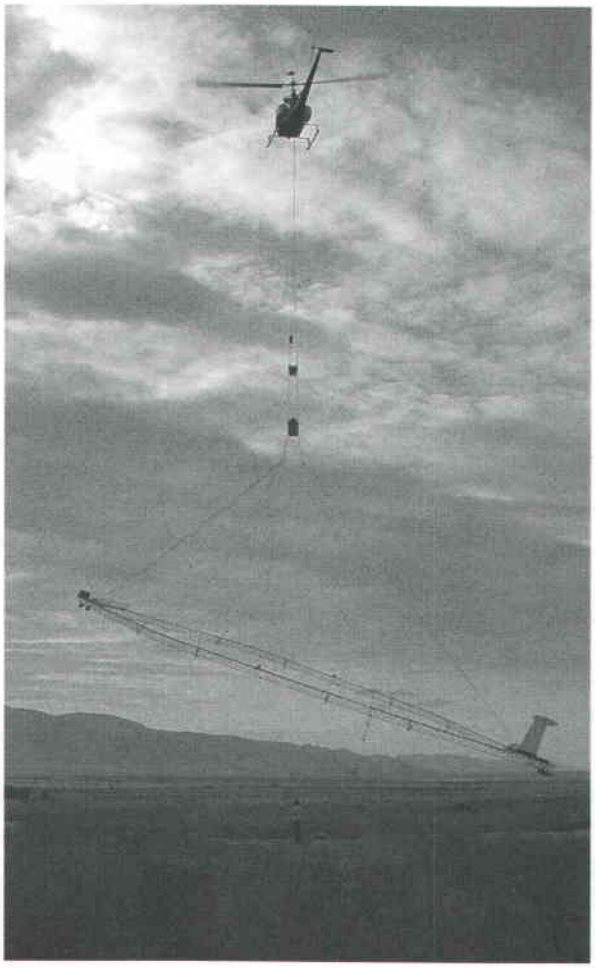
Once scientists interpret the data, they hope the results will produce a better understanding of the subsurface geology, especially the depth and configuration of bedrock formations in the area.

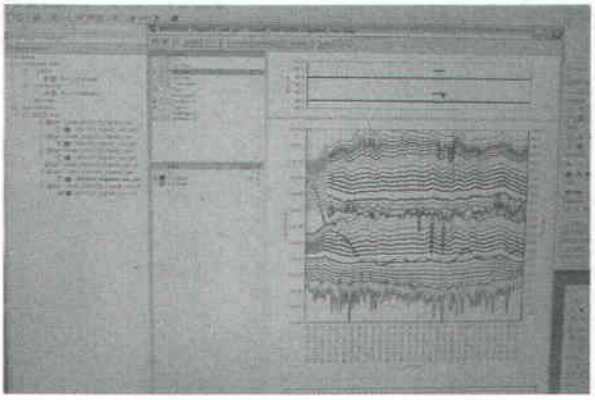
The Army Environmental Center is sponsoring the initiative as part of its effort to determine if this aerial geophysical tool will be useful at Army installations like Tooele to map subsurface features. While relatively new to the United States, this Danish-developed technology has been successfully used for numerous geophysical surveys in Europe.

The survey, which covered a five mile-square area, took about two days to complete, and the data will take another several months to analyze. The depot is optimistic that it will produce useful information.



The SkyTEM array (above) is lifted into the sky. The helicopter flew a pattern of parallel lines across the survey area. For most of the area, the lines were about 600 feet apart. However, in areas where more data was needed, the pattern was flown at 300-foot intervals.





Data from the sensors are recorded by computers (left).

A helicopter (left) lifts the SkyTEM array into the air. Coiled around the framework are transmitters, which pulse electromagnetic energy toward the ground. The sensors that record electromagnetic activity are visible on the right side of the framework.

Around the Depot

Non-operational test continues

The groundwater pump-and-treat system installed for cleaning up groundwater contamination associated with SWMU 2 is entering the second year of its Non-Operational Test.

The purpose of the test is to determine the effect that shutting down the system would have on the groundwater and the contamination in the area.

Engineers and geologists suspect the pump-and-treat system is having little or no significant effect on the plume. This test will confirm whether or not their suspicion is true.

"The system costs more than $1.5 million a year to operate," said Larry McFarland, Environmental Restoration Manager for the Tooele Army Depot, "but we weren't seeing much if any effect on the plume."

He suspects the plume is reaching what scientists call equilibrium—which means the plume is neither expanding nor shrinking.

He said that in time he expects the plume to begin shrinking as source areas are cleaned up and contaminants dilute and disperse naturally.

He said he's not sure how long that will take, but he doesn't think the pump-and-treat system will be effective in shortening that time frame.

The test period will extend for three years. Data gathered from regular groundwater sampling during the test period will support development of an alternative program to manage the groundwater contamination.

Bomb Washout Building fieldwork complete

Work was completed in July 2005 on the cleanup at the Bomb Washout Building, SWMU 42 at Bldg. 539.

The cleanup consisted of consolidating lead-contaminated soil into the site of the washout pond, also the site of soil contamination. With all the contamination in one place, a cap was placed over the entire pond site.

This cap consists of a 60-mil high-density polyethylene (HDPE) liner, which covers the contaminated area, and clean soil over the liner.

The purpose of the cap is to prevent rainwater or snowmelt from seeping through the cap and potentially carrying soil contaminants away from the site or down to the groundwater.

TRC/RAB Meeting

The next meeting of the Technical Review Committee/Restoration Advisory Board (TRC/RAB) will be held Wednesday, July 12, 2006, from 9:30 a.m. to 11:30 a.m.

The meeting will be held at the Tooele County Health Department Building, 151 N Main, Tooele, Utah.

Agenda items include the following:

- Update of current project status and upcoming work.
- Result of the Aerial Geophysical Survey
- On- and off-depot groundwater update
- Video: Tooele Army Depot Mission

The public is encouraged to attend.